

MOUNTAIN PINE BEETLE CONDITIONS  
GRAND TETON NATIONAL PARK

APPRAISAL SURVEY  
September 1958

By

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INTRODUCTION

Outbreaks of mountain pine beetle, Dendroctonus monticolae Hopk., are not new to Grand Teton National Park and adjacent national forests. Chemical treating programs to control the last widespread epidemic were undertaken between 1947 and 1951. From 1951 to 1955 the mountain pine beetle remained at a relatively low level. In 1955 an increase in mountain pine beetle populations was noted and 1956 aerial surveys indicated that epidemic populations might be developing in several areas of Grand Teton National Park. Biological evaluations proved this to be the case and the spring of 1957 saw the initiation of an active control program that resulted in treating 704 infested trees. Continuation of control operations on five units in the spring of 1958 involved treating 1,017 infested trees. (See map.)

SURVEY METHODS

The significance of the mountain pine beetle infestation was appraised in September 1958 by the Division of Forest Insect Research. The objective of the survey was twofold, (1) to evaluate the bark beetle populations in terms of their potential, (2) provide reliable estimates of the number of infested trees.

Biological data on brood density, predator-parasite-beetle relations, and general ecological data pertaining to infested areas were collected and analyzed by Station entomologists. Brood density and predator parasite data were collected by taking 4 x 4-inch bark samples at breast height from randomly selected infested trees. Ecological data was based upon observations. In addition, the survey crew collected data on attack density by counting the number of points of attack under 6" x 12" bark samples taken at breast height on the side of the infested tree facing the center of the plot. All infested trees within the plots were sampled.

To estimate numbers of infested trees and the area infested, a systematic 5 percent line plot survey was used. A 1/5-acre circular plot was taken every two chains along parallel lines run in the cardinal direction most

nearly at right angles to major contours. Survey lines were spaced 20 chains apart. Infested trees and "red tops" (trees from which the beetles flew in 1958) appearing on all plots were recorded by DBH. In addition, on every tenth plot (making a 0.5 percent cruise) trees killed prior to 1957 and all green lodgepole pines over 6" DBH were recorded.

## RESULTS

1. Signal Mountain - 1,792 acres,  $980 \pm 298$  infested trees.

Within an area of 1,792 acres on this unit, 980 trees were found to be infested. This represents an increase in area of 402 acres since 1957. The number of attacked trees per acre has increased from 0.229 to 0.547 per acre.

Biological evaluations show that the bark beetle population potentials remain at a high level. Effective treating in 1957 and 1958 probably prevented a much greater loss of trees in this area by materially reducing the bark beetle population.

2. East Signal Mountain - 654 acres,  $1,040 \pm 354$  infested trees.

This is a relatively new area of epidemic infestation that covered 390 acres in 1957 but increased to 654 acres in 1958. In spite of the chemical treatment in the spring of 1958, numbers of infested trees per acre increased from 0.941 in 1957 to 1.590 in 1958. Here again, the tendency toward increasing populations is so strong that if control had not been undertaken in 1958 the number of presently infested trees would have been much larger.

3. Pacific Creek - 382 acres,  $880 \pm 472$  infested trees.

Treatment was carried out on this unit in the spring of 1957. However, no control project was undertaken in 1958. Survey figures show an increase in the number of infested trees from 0.625 per acre in 1957 to 2.304 in 1958. This represents a slightly higher than 3 to 1 increase of attacked trees this year. Obviously, broods were not sufficiently reduced in 1957 control operations to prevent recurring buildups in 1958.

4. Two Ocean Lake - 412 acres,  $140 \pm 119$  infested trees.

Spring treatment on this unit in 1958 greatly reduced mountain pine beetle populations. Estimates of infested trees per acre dropped from 1.660 to .340. This fall 412 acres were surveyed compared to 200 in 1957. It was evident in this survey that the infestation had not spread to any extent and that control had significantly reduced populations.

5. Jackson Lake - 228 acres, 280±254 infested trees.

The Jackson Lake unit covers 228 acres of new infestation adjacent to the Signal Mountain unit. Surveys show there are about 280 infested trees in the area which amounts to 1.228 infested trees per acre.

#### GENERAL OBSERVATIONS

In addition to areas covered by formal surveys, several areas were inspected for mountain pine beetle and/or spruce budworm activity. Results of the inspection follow:

Jenny Lake: Aerial surveys indicated that some spruce budworm might be present on the west shore of Jenny Lake. Ground appraisals found no budworm activity but did reveal a heavy cone crop. There was some fading of foliage, the cause of which was not determined.

Pilgrim Creek: Several areas were spot checked along this drainage. No bark beetle or defoliator damage was observed.

Colter Bay: At present, no active areas of infestation.

Elk Ranch: A new center of infestation by mountain pine beetle was located approximately one-half mile due east of Elk Ranch on the south side of the Buffalo River. Approximately 40 new attacks were observed on about 600 acres occurring in groups of 3 - 5 trees each. The infested trees contain moderate brood population. This small area of infestation presents a nucleus from which future large-scale attacks could occur.

#### DISCUSSION AND RECOMMENDATIONS

Grand Teton National Park and surrounding national forests are characterized by extensive stands of mature to overmature lodgepole pine. In the past, these timber stands have suffered heavy losses from sporadic epidemic outbreaks of mountain pine beetle.

Aerial detection surveys conducted by the Division of Forest Insect Research, Intermountain Station, have in each of the past three years revealed new centers of mountain pine beetle activity. On-the-ground biological evaluation made in conjunction with aerial surveys, have shown that several of the suspected infestation centers contained epidemic populations. Entomological investigations point up the following:

1. Mountain pine beetle populations are continuing to increase in new and old areas of infestation in Grand Teton National Park.
2. Throughout areas where control measures have been applied, significant reductions in mountain pine beetle broods have occurred. However, on

units where the bark beetle potential is very high, the buildup ratio was so great that beetles flying from the few "missed trees" successfully attacked large numbers of green trees. In some cases the number of newly attacked trees exceeded the number that were treated this spring.

3. In new areas of infestation, relatively few predators and parasites were found. It is our opinion that it will be some time before predators or parasites reach a level where they can be expected to materially reduce the mountain pine beetle populations.

4. Areas treated in 1957 showed significant brood reductions. However, in these areas where followup control was not undertaken in 1958, populations increased rapidly, i. e. Pacific Creek.

5. Biological data collected by using breast height samples shows an average per square foot of 8.97 points of attack and 531 half-grown larvae. This density of attack and brood population, coupled with the apparent lack of host resistance and low number of parasites and predators, shows that epidemic conditions are present in the lodgepole pine stands of Grand Teton National Park.

6. From the entomological standpoint, it would be desirable to control these rather serious bark beetle infestations while they are still relatively small to prevent rapid expansion, both in intensity and area, a distinct possibility judging by present biological evaluation.

Table 1.--Analysis of Grand Teton National Park mountain pine beetle infestation  
Comparison of trees and acres infested in 1957 against 1958

Unit	1 9 5 7				1 9 5 8				Years	
	Infested: acreage	Infested: trees	Infested: trees/a	Infested: acreage	Infested: trees	Infested: trees/a	Average: D.B.H.	Pts. of attack: per sq. ft.	treated	
Signal Mt. <sup>1/</sup>	1,390	318	0.229	1,792	980±298	0.547	9.86	5.52	1957-'58	
Ea. Signal Mt. <sup>1/</sup>	390	367	.941	654	1,040±354	1.590	12.53	14.92	1958	
Pacific Cr. <sup>2/</sup>	200	125	.625	382	880±472	2.304	11.09	8.52	1957	
Two Ocean Lk. <sup>1/</sup>	200	332	1.660	412	140±119	.340	9.57	7.42	1958	
Jackson Lk. <sup>1/</sup>	-	-	-	228	280±254	1.228	13.29	8.46	None	
Elk Ranch <sup>3/</sup>	-	-	-	600	40	-	-	-	-	
Total or Average	2,180	1,142	.524	4,068	3,360±974	.826	11.27	8.97		

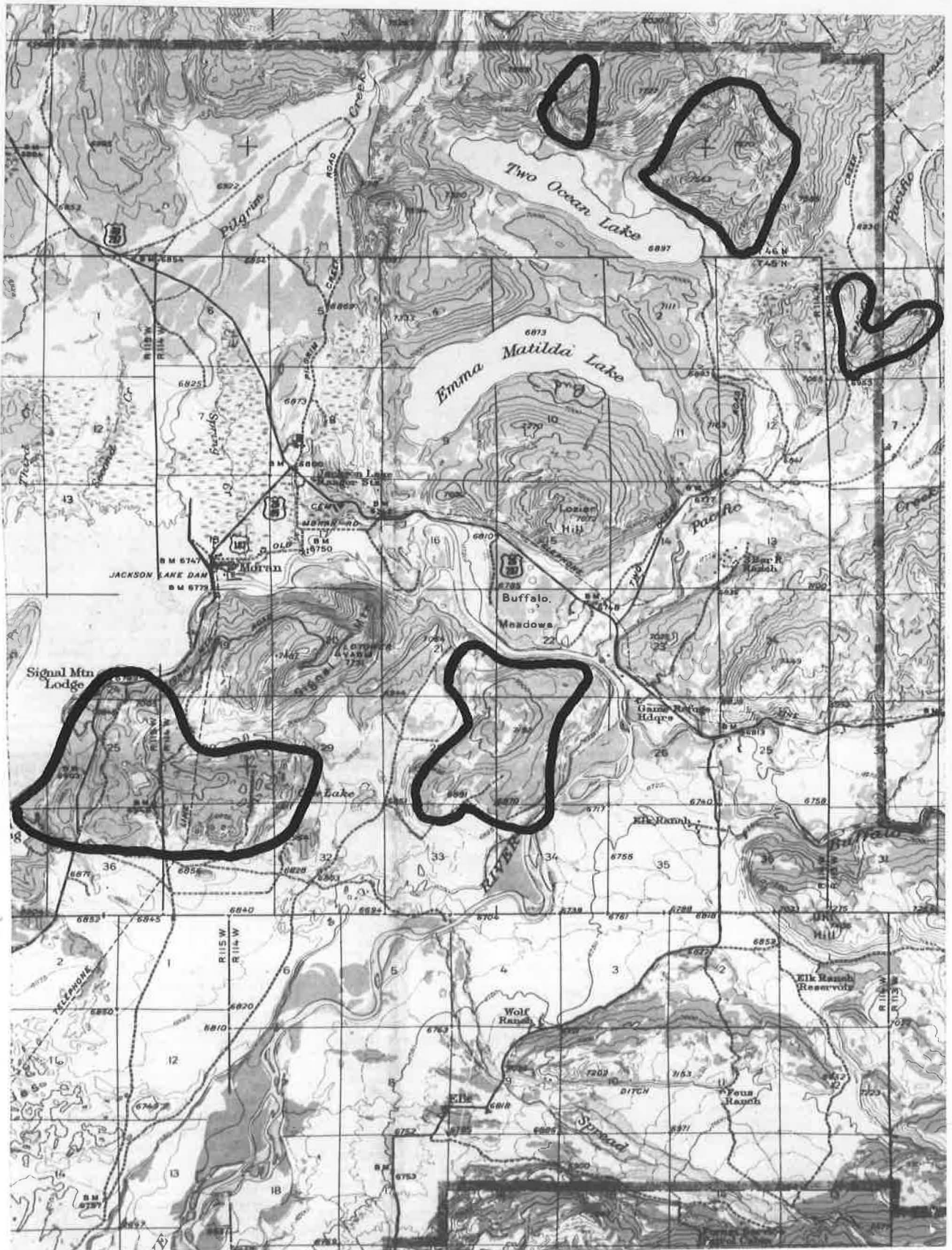
<sup>1/</sup> 5 percent survey

<sup>2/</sup> 10 percent survey

<sup>3/</sup> Scouted

Table 2.--Analysis of Grand Teton National Park mountain pine beetle infestation - comparison of trees killed against residual stand

Unit	S t e m s   p e r   A c r e				
	: Infested:	: Killed :	: Killed :	: Green trees:	: Percent of
	: 1958 :	: 1957 :	: prior to 1957:	: over 6" D.B.H. :	: stand killed or infested
Signal Mt.	: 0.547	: 0.524	: 2.232	: 66.183	: 4.75
Ha. Signal Mt.	: 1.590	: 1.101	: 4.587	: 28.746	: 20.20
Pacific Cr.	: 2.304	: 1.257	: 3.665	: 60.733	: 10.63
Two Ocean Lk.	: .340	: .728	: 3.398	: 36.408	: 10.93
Jackson Lk.	: 1.228	: .175	: 4.386	: 42.982	: 11.87
Totals	: .826	: .704	: 3.114	: 53.460	: 7.98



1. Signal Mountain
2. East Signal Mountain
3. Pacific Creek
4. Two Ocean Lake
5. Jackson Lake



Denotes areas surveyed in fall 1958